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Acaulospora soloidea, a new arbuscular mycorrhizal fungus from rhizosphere soils of *Murraya paniculata*

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Abstract — A new species of *Acaulospora* from the laterite soils in Goa, India is described and illustrated. The spores have a unique wall with fibrillose, hairy outgrowths, which appear like the rays of the sun when mounted in water or PVLG, hence named as *A. soloidea*.

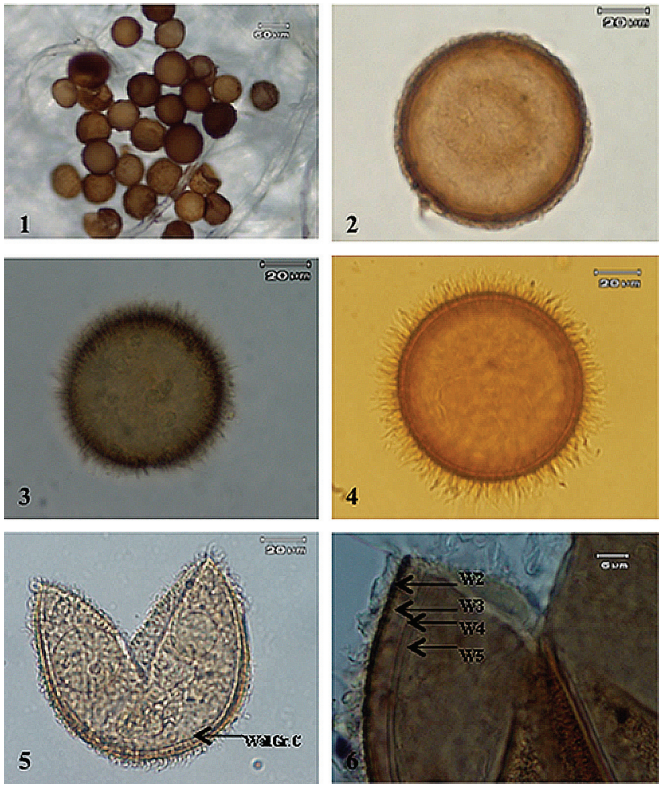
Key words — *Glomeromycota*, spore morphology, taxonomy, species description

Introduction

A survey was conducted on the rhizosphere soils of ornamental flowering plants of Goa state to collect the arbuscular mycorrhizal fungal diversity and distribution data. During the survey an interesting taxon was isolated from *Murraya paniculata*. The spore wall is covered with numerous fibrillose, acellular, hairy outgrowths forming a thick cover. When the spores are mounted in a drop of water or PVLG, these hairs unfold from the spore surface to spread around the spore like solar rays, giving the spore an appearance of sun, hence proposed as *Acaulospora soloidea* sp. nov.

Materials & methods

Spores were isolated from the rhizosphere soils by wet sieving, decanting and sucrose centrifugation (Sieverding 1991). The spores were mounted in Polyvinyl alcohol lacto-glycerol (PVLG) and in PVLG mixed with Melzer's reagent (1:1, v/v). Wall description and terminology are based on those suggested by Walker (1983) and Walker & Vestberg (1998). Type material has been deposited in the Goa University Arbuscular Mycorrhizal Culture Collection. To study more carefully the external morphology of the spores, a number of them were prepared for Scanning Electron Microscopy (SEM). Before the preparation of the material for SEM, spores were put under a dissecting microscope to remove any debris adhering to the spore surface. For SEM studies, clean dry spores were mounted on an aluminum stub with double-sided transparent tape, coated with gold, and observed.



Figs 1–6. *Acaulospora soloidea*. 1. Fresh spores under transmitted light. 2. Dry spore. 3. Spores mounted in PVLG. 4–6. Spores showing wall layers.

Acaulospora soloidea Vaingankar & B.F. Rodrigues, **sp. nov.** Figures 1–12

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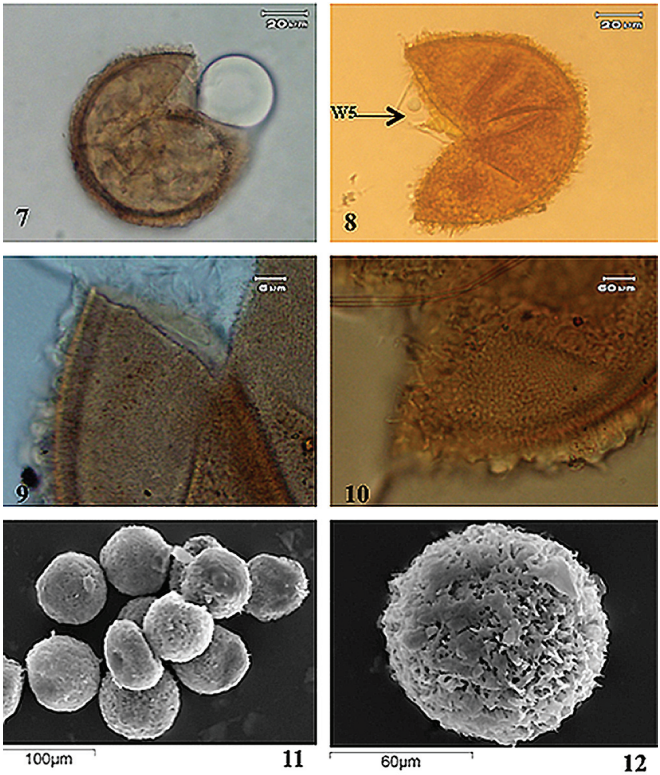
Sporae singulae pallide brunneae vel brunneae, globosae vel subglobosae (50–)65–84(–90) µm diam. Tunica sporae e stratis quinque in turmis tribus, in totum 2.0–3.0 µm crassa. Tunica exterium (stratum 1) unitum, hyalinum 0.4–0.6 µm crassa, caducus, tenue et evanescens. Tunica media stratis duobus, stratum exterius (stratum 2) brunneae, 1.2–1.6 µm crassa, rigido, cum appendicibus numerosis fibrillosis, pilosae sporae, 3–6 µm cr. formantibus. Stratum interioris (stratum 3) hyalinum vel pallide brunneae 0.3–0.4µm crassa. Tunica interior stratis duobus (strati 4, 5); quarto hyalinum, 0.1–0.2 µm crassa; quinque hyalinum, 0.1–0.2 µm crassa amorpho.

Holotype: India. Goa: Arambol, from rhizosphere soil of *Murraya paniculata* (L.) Jack (*Rutaceae*), 3 Jan. 2009, Jyoti. (Arbuscular Mycorrhizal Culture Collection, Goa University: Slide no. OFP-VJ1).

Etymology: *soloidea*, from Latin *sol* (= sun) and *–oideus* (= resembling), referring to the sun like appearance of the spore.



Figs 7–12. *Acaulospora soloidea*. 7. Crushed spore showing lipid content. 8. Spore mounted in PVLG + Melzer's reagent showing inner wall. 9–10. Spores showing hairy ornamentation. 11–12. SEM images of spores.

Spores formed singly in the soil, sessile, borne laterally on the subtending hypha of the sporiferous saccule. The spores are pale brown to brown, globose to subglobose (50–)65–84(–90) µm diam. Spore wall structure of 5 walls (1–5) in three groups (A, B, C), exterior, medium and interior, in total 2.0–3.0 µm thick (Figs 4–6, 8). Group A with a single wall (W1). Wall 1 is hyaline, 0.4–0.6 µm thick, sloughing completely, evanescent and thus present only in young spores. Group B consisting of two walls (W2 and W3). Wall 2 is continuous, brown 1.2–1.6 µm thick, rigid, with numerous acellular, fibrillose, hairy outgrowths forming a pile or thick coat 3–6 µm on the spore surface (Figs 3–4). The hairs are tightly packed together on the spore surface when dry (Fig. 2). The length of each may vary from 10–15 µm, Wall 3 hyaline to light brown, laminated, 0.3–0.4 µm thick tightly adherent to W2. Group C composed of two hyaline flexible walls (W4 and W5), which are formed after the differentiation of spore

wall. Wall 4 hyaline, bilayered, very thin 0.1–0.2 µm, does not show any reaction with Melzer's reagent. Wall 5 is hyaline, thin, 0.1–0.2 µm, amorphous and is not beaded (Fig. 8). Spore contents of hyaline lipid globules (Fig. 7).

Discussion

Gerdemann & Trappe (1974) established the genus *Acaulospora* and presented the first key for the two species, *A. laevis* and *A. elegans*. The key differentiated one species known to produce spores with a smooth surface (*A. laevis*) from another with an ornamented surface (*A. elegans*). Presently 19 *Acaulospora* species with smooth spore surfaces (http://www.lrz-muenchen.de/~schuessler/amphylo/) and 15 *Acaulospora* species with outer spore wall ornamentation have been identified (Sieverding et al. 2006). Schenck et al. (1984) presented a key to the ornamented species of *Acaulospora*. Differentiating features such as spines, tubercles, ridges, folds, pits or cracks as for the spore wall ornamentations were used. The species described here is included in this genus. It presents affinities with the type species in spore shape and wall layers. It differs from other *Acaulospora* species in the morphology of the spore surface, which gives rise to numerous acellular, fibrillose hairy outgrowths forming a pile or thick coat on the spore surface, which when extended look like the rays of the sun. On the basis of its morphological characteristics, the isolate represents a novel species of the genus *Acaulospora*, for which the name *A. soloidea* sp. nov. is proposed. *Acaulospora soloidea* can be easily distinguished from all other known species in the genus.

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Literature cited

Gerdemann JW, Trappe JM. 1974. The *Endogonaceae* in the Pacific Northwest. Mycologia Memoir No. 5. 76 p.

Oehl F, Sýkorová Z, Redecker D, Wiemken A, Sieverding E. 2006. *Acaulospora alpina*, a new arbuscular mycorrhizal fungal species characteristic for high mountainous and alpine regions of the Swiss Alps. Mycologia, 98(2): 286–294. doi:10.3852/mycologia.98.2.286

Schenck NC, Spain JL, Sieverding E, Howeler RH. 1984. Several new and unreported vesicular-arbuscular mycorrhizal fungi (*Endogonaceae*) from Colombia. Mycologia 76: 685–699. doi:10.2307/3793226

Sieverding E. 1991. Vesicular-arbuscular mycorrhiza management in tropical ecosystems. GTZ Eschborn Germany.

Walker C. 1983. Taxonomic concepts in the *Endogonaceae:* spore wall characteristics in species descriptions. Mycotaxon 18: 443–455.

Walker C, Vestberg M. 1998. Synonymy amongst the arbuscular mycorrhizal fungi: *Glomus claroideum, G. maculosum, G. multisubstensum* and *G. fistulosum*. Annals of Botany 82: 601–624. doi:10.1006/anbo.1998.0714